6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 261

[EPA-HQ–RCRA–2016–0040; FRL-10014-42-OLEM]

Corrosive Waste Rulemaking Petition; Denial

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice; final denial of rulemaking petition.

SUMMARY: The Environmental Protection Agency (EPA or the Agency) is responding to a rulemaking petition ("the petition") requesting revision of the Resource Conservation and Recovery Act (RCRA) corrosivity hazardous waste characteristic regulation. The petition requests that the Agency make two changes to the current corrosivity characteristic regulation: revise the regulatory threshold for defining waste as corrosive from the current value of pH 12.5, to pH 11.5; and expand the scope of the RCRA corrosivity definition to include non-aqueous wastes in addition to the aqueous wastes currently regulated. The Agency published a tentative denial of the rulemaking petition on April 11, 2016. Today the Agency is publishing a final denial of the rulemaking petition.

DATES: This final action is effective on **[INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA–HQ–RCRA–2016–0040, at *http://www.regulations.gov.* All documents in the docket are listed on the http://www.regulations.gov website. Certain other material, such as copyrighted material,

is not placed on the internet and will be publicly available only in hard copy form. Publicly available docket materials are available electronically through http://www.regulations.gov.

FOR FURTHER INFORMATION CONTACT: Gregory Helms, Materials Recovery and Waste Management Division, Office of Resource Conservation and Recovery, Office of Land and Emergency Response, (Mail Code 5304P), Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Washington, DC 20460; telephone number: 703-308-8845; email address: helms.greg@epa.gov

SUPPLEMENTARY INFORMATION:

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I. Executive Summary

This action finalizes the Agency's April 11, 2016 tentative denial of a rulemaking petition submitted by the group Public Employees for Environmental Responsibility (PEER) and Dr. Cate Jenkins, PhD ("PEER/Jenkins Rulemaking petition"), on September 8, 2011, requesting that the Agency revise the corrosivity hazardous waste characteristic regulation promulgated under Subtitle C of the Resource Conservation and Recovery Act (RCRA). The petitioners sought two changes to the existing corrosivity characteristic regulation: 1) revision of the pH regulatory value for defining a waste as corrosive hazardous waste from the current pH 12.5 or higher, to pH 11.5 or higher; and 2) expansion of the scope of the corrosivity regulation to apply to non-aqueous wastes in addition to the aqueous wastes addressed by the current regulation. The Agency published for public comment a tentative denial of the PEER/Jenkins Rulemaking petition on April 11, 2016 (81 FR 21295), proposing to deny both requested revisions to the corrosivity characteristic regulation sought by the petitioners. In this Notice (and the Response to Comments document accompanying it), the EPA responds to the public comments received on the tentative denial and takes final action to deny the petition.

II. General Information

A. Does this action apply to me?

As the Agency is not adding to or revising its regulations with today's Notice, no entities or wastes will be newly regulated or deregulated.

B. What action is EPA taking?

Today the Agency is issuing a final response to the PEER/Jenkins rulemaking petition of

September 8, 2011 that seeks revision to the RCRA corrosivity characteristic regulation for classifying waste as hazardous that would expand the scope of the regulation and subject additional waste to RCRA's cradle-to-grave waste management system. The Agency is denying the petition in its entirety.

Under Subtitle C of RCRA, the EPA has developed regulations to identify solid wastes that must then be evaluated to determine whether they must also be classified as hazardous waste. Corrosivity is one of four waste characteristics that may cause the waste to be classified as "RCRA hazardous." The Agency defines which wastes are hazardous because of their corrosive properties at 40 CFR 261.22. On September 8, 2011, the nongovernmental organization (NGO) PEER and Cate Jenkins, Ph.D., submitted a rulemaking petition to the EPA seeking changes to the current regulatory definition of corrosive hazardous wastes under RCRA. On April 11, 2016, the Agency published a *Federal Register* notice tentatively denying the rulemaking petition. In that notice of denial, the Agency provided its evaluation of the requested regulatory revisions, the materials submitted by the petitioners in support of the regulatory revisions being sought, and supplementary information collected by the Agency and identified as relevant to the issues raised by the petition. The 2016 tentative denial of the petition also solicited comments from the public on the issues raised by the petition and its supporting materials, the Agency's supplemental materials, materials submitted by a group representing industries that might be affected by any changes to the corrosivity regulation and the Agency's assessment of all these materials. Comments were initially to be accepted until June 10, 2016; however, the public comment period was extended by six months, closing on December 7, 2016, at the request of the petitioners.

Today's Notice (and accompanying supporting material) responds to the comments received from the public on the tentative denial, and takes final action on the rulemaking petition, denying the petitioners' request to revise the RCRA corrosivity regulation. The reasons for the Agency's denial of the petition are described below in today's Notice.

C. What is EPA's authority for taking this action?

The corrosivity hazardous waste characteristic regulation was promulgated under the authority of sections 1004 and 3001 of RCRA, as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. 6903 and 6921. The Agency is responding to this petition for rulemaking pursuant to 42 U.S.C. 6903, 6921 and 6974, and implementing regulations 40 CFR parts 260 and 261.

D. What are the incremental costs and benefits of this action?

There are neither costs nor benefits resulting from this final action, as the Agency is not promulgating any regulatory changes.

III. Background

A. Who submitted the petition to the EPA and what do they seek?

On September 8, 2011, petitioners PEER and Cate Jenkins, Ph.D., submitted to the EPA a rulemaking petition seeking revisions to the RCRA hazardous waste corrosivity characteristic definition (see 40 CFR 261.22(a)(1)).[1] On September 9, 2014, the petitioners filed a petition for Writ of Mandamus, arguing that the Agency had unduly delayed in responding to the 2011 petition, and asking the Court[2] to compel the Agency to respond to the petition within 90 days. The Court granted the parties' joint request for a stay of all proceedings until March 31, 2016. Following publication of the tentative denial of the petition, the parties jointly petitioned the court to hold the case in abeyance until the Agency publishes in the *Federal Register* a final denial of the Petition for Rulemaking or an Advanced Notice of Proposed Rulemaking or a Proposed Rule. Under this agreement, the Agency is obligated to file status reports with the

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[1] **§261.22**(a)(1) identifies an aqueous solid waste as a corrosive hazardous waste if a representative sample exhibits a pH less than or equal to 2, or greater than or equal to 12.5.when tested with a pH meter using EPA Method 9040C, published in the Agency Hazardous waste test method Compendium, SW-846. https://www.epa.gov/hw-sw846/sw-846-compendium

[2] The Petitioners' lawsuit was filed with the U.S. Court of Appeals for the District of Colombia Circuit. https://www.cadc.uscourts.gov/internet/home.nsf

court at 120-day intervals. The latest such report was filed with the court on April 5, 2021.

The petition sought two specific changes to the 40 CFR 261.22(a)(1) definition of a corrosive hazardous waste:

1. Reduction of the pH regulatory value for defining alkaline corrosive hazardous wastes from the current standard of pH 12.5 or higher to pH 11.5 or higher; and
2. Expansion of the scope of the RCRA hazardous waste corrosivity definition to include non-aqueous wastes, as well as currently regulated aqueous wastes.

The Agency published for public comment a tentative denial of this RCRA rulemaking petition on April 11, 2016, in accordance with 40 CFR 260.20(c) and (e). The public comment period for the tentative denial was originally scheduled to close on June 10, 2016, but was extended until December 7, 2016, at the request of the petitioners. The Agency received 29 comments on the tentative denial (including requests for a comment period extension), and is today responding to those comments, and taking final action to deny all parts of the petition.

B. Who commented on the Tentative Denial of the Petition?

Commenters include the petitioners, a number of groups representing different sectors of industry, health research groups studying persons exposed to the World Trade Center(WTC) collapse, the state of Michigan Department of Environmental Quality (DEQ), national and state groups representing municipal wastewater treatment facility owners/operators (also known as publicly owned treatment works, or POTWs), and several private citizens. The public comments on the Agency's tentative denial of the PEER/Jenkins Rulemaking petition can be found by searching at: http://www.Regulations.gov, using Docket ID Number EPA–HQ–RCRA–2016–0040.

In a separate action, on April 13, 2017 (82 FR 17793), EPA opened a public comment period to solicit public comment on virtually any existing EPA regulation, to implement

Executive Order 13777 on regulatory reform (See: http://www.Regulations.gov, Docket ID Number EPA–HQ–OA–2017–0190). The Agency requested that the public identify regulations they believed to be in need of revision, including regulations commenters believed to be outdated, unnecessary, ineffective or unduly burdensome. Eight of the more than 400,000 comments received by the docket addressed the PEER/Jenkins Rulemaking petition and the Agency's initial response presented in the tentative denial. Seven of the comments were from particular industries or industry trade groups or organizations, and one was from the State of Oklahoma Department of Environmental Quality (DEQ). EPA considered all the comments received, on both the tentative denial and the eight comments received on the PEER/Jenkins Rulemaking petition through the implementation of Executive Order 13777. The petitioners' comments and those of several individuals opposed the Agency's tentative denial. Industry commenters generally supported it, as did the Michigan DEQ, organizations representing publicly owned treatment works (POTWs, which are municipal wastewater treatment facilities), and several private citizens. The Oklahoma DEQ supported regulation of non-aqueous wastes that may be corrosive. While two WTC-survivor health research groups commented in support of requests to extend the public comment period for the tentative denial, neither of these groups submitted substantive comments.

IV. Public Comments Received and Agency Response.

A. Petitioner comments

Petitioners PEER and Dr. Jenkins submitted extensive comments addressing most aspects of the tentative denial. Today's Notice addresses comments the Agency believes present the petitioners' key arguments and supporting information advocating for their requested revisions to the corrosivity regulations. The Agency responds to more detailed petitioner comments in the Response to Comments document accompanying today's Notice, which is available in the public docket for this action. While the PEER/Jenkins comments are wide-ranging, they can be summarized as raising the following major objections to the tentative denial and its conclusions:

- The petitioners assert that the original corrosivity regulation did not appropriately consider the information available at the time the regulation was developed (i.e., 1980).
- The petitioners assert that the Agency has a legal obligation to implement the Globally Harmonized System for the Classification and Labeling of Chemicals (GHS) criteria as the RCRA corrosivity regulation.
- The petitioners assert that the Agency inadequately considered information submitted by petitioners in support of the petition.
- The petitioners assert that many of the injuries to World Trade Center (WTC) disaster first responders and others were caused by the corrosive nature of the dust generated by the collapse of the towers[3], and that a revised RCRA corrosivity regulation definition can prevent such injuries should similar exposures occur in the future.
- The petitioners assert that the EPA misunderstands the applicability of RCRA regulations to the WTC dust and debris.
- The petitioners assert that the Agency impermissibly considered information on the possible economic impacts of revising the corrosivity regulation submitted by industry stakeholders and their representatives, and that the conclusions in the tentative denial are largely based on industry impact estimates.

The discussion below describes the petitioners' comments on the tentative denial in more detail

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[3] The term "corrosivity" is used extensively in discussions of this issue by both the petitioners and by the Agency. However, the Agency believes petitioners and the Agency each intend different meanings when using the term. The petitioners apply the term "corrosivity" to a broad range of possible impacts to human health, for example over a pH range of 9.76-11.5, as described at page 53 of the May 6, 2007 petition support document. When the Agency uses the term "corrosivity" in the context of impacts to exposed humans, it is referring to potentially severe injuries, such as dissolving of skin proteins, chemically combining with cutaneous fats, and severe damage to keratin, as described in the 1980 Background Document supporting the original corrosivity regulation and in the TD (see 81 FR 21297-21299, April 11, 2016). While today's Notice focuses on potential adverse effects on humans (as this is the petitioners' focus), the Agency was also concerned about the potential of corrosive wastes to damage storage containers, resulting in releases, mobilization of co-disposed acid or base-soluble wastes, and potential to adversely affect aquatic life when developing the corrosivity characteristic in 1980. This concern was largely addressed by part 261.22(a)(2).

and provides the Agency's response to those comments.

1. The petitioners assert that the Agency inadequately considered the available information when it promulgated the existing RCRA corrosive hazardous waste definition in 1980.

As in the petition, the petitioners argue in their comments on the tentative denial that the original regulation did not appropriately consider the information available in 1980, and that this represents an error. Petitioners believe that in relying on the 1972 International Labor Organization (ILO) guidance, the Agency should have directly promulgated the ILO guidance values as the corrosivity regulation and should not have considered additional information in establishing the regulation. The ILO guidance, as well as GHS guidance (discussed below), is intended to represent the inherent, or intrinsic hazards that may be posed by direct contact with materials, with no controls on or mitigation of exposure. However, RCRA directs the Agency to regulate hazards as they occur in waste (when plausibly mismanaged) in most cases, and the Agency regulated potentially corrosive wastes under RCRA section 1004(5)(B) (42 USC 6903(5)(B)), as has been done for most wastes regulated as RCRA hazardous.[4] RCRA's

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[4] Consideration of corrosivity hazards under plausible mismanagement conditions is part of the basic program structure developed by the Agency in 1980 for implementing RCRA. The Agency described its approach to implementing RCRA's hazardous waste classification requirements in the rulemakings that promulgated the bulk of the RCRA regulatory program in 1980. In proposing its approach to developing hazardous waste characteristics regulations, the Agency proposed three criteria, the second of which was "…that the likelihood of a hazard developing if the waste is mismanaged is sufficiently great….". The Agency continued this discussion by noting that "EPA distilled the common features of hazardous waste – when improperly disposed of—into the following groups of candidate characteristics: ….2. Corrosivity…." This discussion references the language of RCRA section 1004(5)(B) as the basis for the hazardous characteristics regulations, including corrosivity. (43 FR 58950, December 18, 1978) The Agency clarified the role of RCRA section 1004(5)(A) in implementing RCRA in the rulemaking promulgating most of the RCRA regulatory program. In considering how to structure and use hazardous waste listings, the Agency identified criteria for two categories of listed waste: acutely hazardous waste and toxic waste. RCRA section 1004(5)(A) is referenced in the Agency's description of acutely hazardous waste, noting that these wastes are so dangerous that they meet the statutory definition "…regardless of how they are managed. It is EPA's conviction that most wastes are hazardous only because they "pose a substantial …hazard …when improperly managed" and thus meet RCRA section 1004(5)(B). The discussion goes on to note that acutely hazardous waste "…include those which have been shown to be fatal to humans at low doses…" but notes that waste explosives would also meet the Part (A) definition. EPA used these criteria to identify a list of high concentration waste commercial chemical products identified as acutely hazardous at 40 CFR 261.33 (45 FR 33106, May 19, 1980). Also see 40 CFR 261.10, 261.11(a)(2) and 261.11(a)(3).

The Agency identified one report of an LD_{50} value below the acute hazard criteria, for sodium hydroxide (acute

prohibition on the open dumping of wastes (42 USC 6903(14)), and requirements for solid waste disposal and management (42 USC 6944(a), (b)) means that all waste is intended to receive some level of management (under either federal or state laws and regulations), with some exceptions.[5] Regulations at 40 CFR parts 240-258 (particularly parts 257 and 258) describe the minimum management requirements for wastes, regardless of the hazards they may (or may not) pose. Wastes found to potentially pose significant or substantial hazards when managed at this minimal level of control require more stringent management. Such wastes warrant classification as hazardous (under 42 USC 6903(5)(B), through the listings and hazardous characteristics regulations) and control under the more stringent and detailed provisions of RCRA Subtitle C and the regulations developed under its authority. The Agency reserved RCRA section 1004(5)(A) for wastes that pose a significant hazard regardless of how they are managed. Therefore, the Agency appropriately relied on information in addition to the ILO guidance when developing the RCRA corrosivity characteristic, as described in the 1978 proposed rule, the 1980 final rulemaking and its supporting Background Document (EPA 1980), when it published the tentative denial of the petition (81 FR 2199-21302, April 11, 2016),[6] and in issuing today's final Notice and supporting information.

When developing the current corrosivity regulation, the Agency proposed a value of pH 12.0 or higher to define hazardous corrosive waste (for aqueous wastes; 43 FR 58951-952,

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hazard criteria LD50=50 mg/kg-bw or lower; NaOH reported LC50=44 mg/kg-bw, in rats). While this report may indicate that sodium hydroxide could be added to the "P-list" of hazardous wastes, it does not imply that potentially corrosive wastes considered broadly may pose acute toxic hazards (see: 40 CFR 261.33, and NIOSH 2015, as reported by PubChem/NLM; downloaded March 20, 2019).

[5] 40 CFR part 257.1 describes the scope of the solid waste management regulations. This part identifies exceptions from the general requirements for some wastes that are otherwise regulated (e.g., under section 402 of the Clean Water Act, or under 40 CFR Part 503), or for some materials which may not be waste when appropriately reused.

[6] The Agency has also considered factors in addition to inherent hazard in regulating many other wastes. For example, in developing the toxicity characteristic (TC) regulation (40 CFR 261.24), the Agency explicitly incorporated a measure of the leaching release potential of toxic constituents in waste (the Toxicity Characteristic Leaching Procedure test) and also estimates of the likely dilution and attenuation of hazardous constituent concentrations that may occur during groundwater transport from a disposal site to a down-gradient drinking water well that could be a point of human exposure (see: 55 FR 11798, March 29, 1990).

December 18, 1978). In consideration of public comments on the proposal, EPA established a final regulatory value of pH 12.5 or higher (and pH 2.0 or lower) to define aqueous corrosive hazardous waste (45 FR 33109, May 19, 1980). A consideration of the Agency in establishing the final regulation was the use of lime for treatment of municipal wastewater treatment sludges, as discussed in the Background Document (EPA 1980, pp 13-16). Such sludges contain a variety of organic chemicals, inorganic chemicals, and microbial contamination. Lime has been used for many years as a sludge treatment, particularly for the inactivation of microbial pathogens in the sludge. Such pathogens are effectively inactivated when the pH of the sludge is raised to pH 12 or higher, for a minimum of two hours and maintained at pH levels above 11.5 for an additional 22 hours (EPA 1981; EPA 1989; NRC 1996; Krach et.al 2008; and the National Lime Association, at: https://www.lime.org/lime-basics/uses-of-lime/enviromental/biosolids-and-sludge/). Treatment with lime can also provide control of odors that may be associated with more active biological pathogens. Lime continues to be used for biosolids "conditioning", which allows this material to be more safely used as an agricultural fertilizer, and also to be more safely disposed in a municipal or other landfill when not used as a fertilizer. Therefore, the proposal to revise the corrosivity regulatory value to 11.5 could have a significant impact on the implementation of available treatments and management options for municipal wastewater treatment sludges.

The petition and petitioner comments on the tentative denial argue that consideration of the value of using lime in waste treatment in setting the 1980 regulatory standard was improper at the time. However, considering the corrosive potential of wastes treated to high pH using materials like lime, with its widespread use for effective POTW sludge pathogen inactivation and stabilization was and remains an appropriate balancing of different waste management risks by the Agency. As the Agency noted in the tentative denial, no challenge to the 1980 regulation was filed, and the time period to challenge that rule has long passed under the judicial review provision of RCRA section 7006, which requires such challenges to be filed within 90 days of

the rule's promulgation. The opportunity to petition the Agency for changes to any RCRA rule is always available to members of the public (as in the current case), but such petitions are evaluated typically based on new information identified by petitioners (as well as information identified by the Agency, and those commenting on a proposed Agency action) as the basis for the requested changes to a regulation.

Petitioners also argue that the current pH 12.5 corrosivity regulatory value is no longer necessary to allow reuse of biosolids due to other changes in the RCRA regulatory program, such as RCRA deference to the Clean Water Act (CWA) programs promulgated at 40 CFR Part 503 addressing biosolids use as agricultural fertilizer. However, biosolids that are RCRA hazardous cannot be land applied as fertilizer under the Part 503 program.[7] If the corrosivity regulatory pH was changed to pH 11.5 as petitioners request, lime stabilized biosolids (typically having a pH of 12.0 or higher) would be considered RCRA hazardous and ineligible for the Part 503 program. As hazardous waste, stabilized biosolids would be treated to reduce their pH to below 11.5, so they would no longer be hazardous waste ("decharacterization" treatment and treatment for underlying hazardous constituents, which would be required by the RCRA land disposal restrictions (LDR) regulations; 40 CFR 268.40). Stockpiled biosolids with lowered pHs show increases in biological activity (EPA 1981), resulting in the development of strong odors.

2. The petitioners assert that the Agency must use the Globally Harmonized System for the Classification and Labeling of Chemicals (GHS) as the basis for the RCRA corrosivity regulation.

In the petition, and in comments on the Agency's tentative denial, the petitioners argue that the Agency should promulgate the guidance on corrosivity adopted by GHS as the RCRA

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[7] 40 CFR 503.6 (e) on hazardous sewage sludge states that the regulations do not apply to sewage sludge that is hazardous waste. Therefore, pH 12 sludge classified as corrosive hazardous waste (under the petitioners' proposals) would be ineligible for land application under the Part 503 program.

corrosivity regulation, and further argues that the Agency has a legal obligation to do so. As described in greater detail in the tentative denial (81 FR 21300-21302, April 11, 2016), GHS is a technical guidance document developed by coordination among several organizations of the United Nations (U.N.), with the participation of many U.N. member nations, including the U.S., and other stakeholders.[8] The goal of GHS was to create a single hazard evaluation and labeling/communication system that could be a global reference for chemicals and chemical products in transport, in the workplace and in commerce generally (GHS, Forward, paragraph 2). GHS is based on U.N.-sponsored technical guidance on the safe transport and handling of dangerous goods as well as on national and international systems for identifying chemical hazards in the workplace.

The petitioners argue that the Agency has a legal obligation to implement the GHS criteria on corrosivity/irritancy as the RCRA corrosivity regulation.[9] However, they acknowledge that adoption or reliance on GHS in regulations is voluntary:

> "Although the GHS standard is voluntary for U.N. member nations, the United States has chosen to adopt it." (page 54, petitioner comments)

In support of their statement that the United States has chosen to adopt GHS, petitioners reference a U.S. State Department website that encourages the adoption of GHS by federal regulatory agencies, and which notes that EPA participated in a GHS implementation committee managed by the State Department. However, the petitioners misunderstand the role and authority of this implementation committee. While seeking to facilitate adoption of GHS criteria in appropriate federal regulatory programs, the committee has no statutory authority to require

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[8] GHS was first published in 2003 and has been periodically revised; it is currently in its eighth revision, published in 2019. See: https://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

[9] In arguing that the EPA must adopt the GHS corrosivity criteria as the RCRA corrosivity definition, petitioners also over-simplify GHS. In the petitioners' view, "adopting GHS" in the current context means establishing pH 11.5 as the corrosivity regulatory value. In fact, the GHS corrosivity criteria (GHS Chapter 3.2) also rely on human exposure data, animal test results, and *in vitro* test results as preferred data sources, and reliance on pH 11.5 only if other data are not available.

that federal agencies adopt GHS in whole or in part in any of their regulatory programs. For example, while EPA has considered using GHS for product classification or labeling under FIFRA, it has not done so (https://www.epa.gov/pesticide-labels/pesticide-labels-and-ghs-comparison-and-samples; downloaded 03/02/20). The Consumer Product Safety Commission (CPSC) has also considered GHS but not incorporated it into its regulations (https://www.cpsc.gov/content/policy-of-the-us-consumer-product-safety-commission-on-the-globally-harmonized-system-of).

The Department of Transportation (DOT) periodically updates its hazardous materials regulations (HMR) to ensure that they are "harmonized" with a variety of international transportation safety standards, including GHS. "Harmonizing" regulations generally means that although two sets of standards may be somewhat different from one another, they are not inconsistent. DOT most recently updated its regulations on May 11, 2020, including revising its definition of corrosivity. DOT notes that its revised corrosivity regulation does not rely on pH extremes.[10]

Only one federal agency, the Occupational Safety and Health Administration (OSHA), has chosen to revise its regulations to implement a modified version of GHS, for its hazard communication standard (HCS), under the authority of the Occupational Safety and Health Act of 1970 (77 FR 17574, March 26, 2012).[11] Two EPA programs focused on regulation of

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[10] DOT's most recent revision to its regulations was published May 11, 2020 (91 FR 27810) in which DOT focuses first on consistency with the U.N. Transport of Dangerous Goods guidance. In modifying its regulation defining corrosivity, DOT specifically noted that its regulation does not rely on pH extremes to define corrosivity, a somewhat different approach than GHS takes (See 91 FR 27830, May 11, 2020).

[11] The UNECE GHS implementation tracking website provides progress for all countries. For the U.S., the latest reported activity by the EPA dates to 2007, and the latest reported GHS activity for CPSC is for 2008. (https://www.unece.org/trans/danger/publi/ghs/implementation_e.html#c25877). The U.S. government has also not adopted GHS criteria as the basis for waste managment controls at U.S. military bases in foreign countries. For example, there is no reference to GHS in the 2018 "Japan Final Governing Standards" at: https://www.usfj.mil/Portals/80/2018%20JEGS.PDF?ver=2018-04-26-195301-487

chemicals reference or rely on the OSHA HCS regulations. The Emergency Planning and Community Right-to-Know Act (EPCRA) emergency response program regulations require facilities to provide state and local emergency responders with chemical hazard information using OSHA/HCS-required safety data sheets (SDS) for chemicals they have on-site, and the EPCRA regulations have been updated to be consistent with the new OSHA requirements (See: 81 FR 38104, June 13, 2016). Under the Toxic Substances Control Act (TSCA), regulations for significant new uses of chemicals require a written hazard communications program to provide information to workers that may handle chemicals that are part of this program. Employers may rely on existing hazard communication programs established under the OSHA HCS regulations to show compliance with the TSCA program requirements. The Agency has proposed regulatory revisions to harmonize these EPA program requirements with the revised OSHA HC (81 FR 49598, July 28, 2016).

While the UN aspires to make GHS a globally implemented system for evaluating and classifying the hazards posed by chemicals and chemical products, guidance such as GHS only has the force of law in the United States if adopted and implemented as a requirement (or regulation) under the authority of specific laws (See GHS sections 1.1.2.6, 1.1.3). As guidance, GHS may be used by federal agencies on a voluntary basis, consistent with their enabling statutes. The Agency did review and consider the GHS corrosivity criteria and their underlying basis in responding to the rulemaking petition. However, the Agency's conclusion was that direct use of the GHS criteria as a corrosivity regulatory standard was not appropriate as the GHS criteria are intended to identify the inherent or intrinsic hazards of chemicals or chemical products (which are usually associated with direct exposure to chemicals), and do not consider

how exposures in different settings, such as waste management scenarios of concern under RCRA, might reduce the actual hazard posed. GHS is also a flexible classification system, and a pH-based hazard determination can be rebutted and changed by other test data, whereas RCRA hazardous characteristic determinations are not rebuttable (the criteria are codified in regulations that can only be changed through subsequent notice and comment rulemakings, and there is no delisting program for wastes that exhibit a hazardous characteristic).

The petition and petitioner comments on the tentative denial raised similar issues concerning guidance on corrosivity by the ILO and the Basel Convention on Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention, or Basel). As described in the tentative denial and the background document supporting the existing corrosivity characteristic regulation (EPA, 1980), the Agency relied in part on the 1972 ILO guidance on corrosivity, and also considered other factors related to waste management in establishing the corrosivity regulation. While petitioners believe the ILO guidance should be the only basis for the RCRA corrosivity definition (i.e., that the Agency should directly promulgate the ILO recommended value as the RCRA corrosivity regulation), consideration of waste management factors is appropriate and within the Agency's discretion in establishing elements of national waste regulatory programs (RCRA section 1004(5)(B); 42 USC 6903(5)(B)).

The Basel Convention also addresses the potential corrosivity of wastes, as described in the tentative denial. Petitioners asserted in the petition and in their response to the tentative denial that the Agency is obligated to adopt the Basel Convention corrosivity definition. However, Annex III of Basel relies on a narrative definition for identifying corrosive wastes, rather than directly relying on pH, as the petitioners suggest the U.S should do. Further, the United States is not a party to the Basel Convention, and so has not obligated itself to implement Basel Convention requirements. Even if the U.S. were a party to the Basel Convention, the legally binding aspects of Basel are focused on transboundary movements of waste (i.e., imports and exports), through a system of notice and consent for such shipments between governments.

The Basel hazardous waste criteria apply only to such imports and exports of waste, and nations that are Basel Parties are not obligated to (but may, at their discretion) use the Basel criteria in their domestic waste management programs.

Having determined that reliance on GHS criteria in establishing regulatory requirements is voluntary (consistent with enabling statutes), the Agency turns to the question about whether or how GHS might be an appropriate basis for regulations under RCRA. The basis for GHS criteria is identified as "the intrinsic hazard" of chemicals, and implies direct exposure. GHS determinations of intrinsic hazard do not consider possible material handling procedures that might mitigate risks or the potential for waste or contaminant release, transport and exposure. RCRA provides authority to regulate waste either due to its intrinsic hazard (where such hazards are of a severe and acute nature), or when a waste poses risk as a result of mismanagement. However, EPA's approach is in most cases to regulate wastes posing risks when plausibly mismanaged, particularly where a waste does not exhibit acutely and highly toxic or other extremely hazardous properties(see Footnote 6 and 45 FR 33105-33109, May 19, 1980). This means that as a practical matter, under RCRA most hazards are identified and risk is evaluated in the context of waste management conditions and practices. This was the reasoning the Agency used in 1980 when it considered both the use of lime for POTW sludge stabilization[12] and other waste treatment uses of lime, as well as the 1972 ILO guidance values, in establishing the current RCRA corrosivity regulatory value. In urging the adoption of GHS criteria as the basis for the corrosivity regulation, the petitioners are making the same argument as discussed elsewhere in today's Notice and in the response to comments document: that the Agency should base the corrosivity regulation solely on assessment of the intrinsic hazards potentially corrosive wastes may pose. The Agency has instead determined that it is appropriate to make waste management

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[12] Lime continues to be used in treating POTW sludge (also known as biosolids) as well as in treatment of other wastes. Lime is used to increase the pH of biosolids (usually to pH 12) to control bacterial growth and odors. (See: EPA, 1981, NRC 1996; Krach e.al., 2008; The Lime Association, 2018).

considerations part of the basis for the corrosivity hazardous waste definition.

3. The petitioners assert that the Agency inadequately considered supporting materials submitted with the petition, and other facts cited by the petition.

Petitioner comments on the tentative denial argue at length (pp. 1-18) that the Agency focused too narrowly in the tentative denial when considering the WTC disaster dust, cement kiln dust (CKD), and building demolition dust as examples of potentially corrosive dust that warrant regulation. Petitioners believe the Agency inadequately considered additional facts presented in the petition, and particularly information in the supporting materials submitted with the petition, and in so doing, violated its obligations under the Administrative Procedure Act to consider and respond to significant issues and facts brought to it during a rulemaking.

The tentative denial focused on the WTC, CKD and building demolition dust discussions presented in the petition because the petition focused on these (See petition pp 28-36) in arguing for regulation of non-aqueous waste. The Agency did in fact review and consider the supporting material submitted with the petition as well as the petition itself and the relevant documents cited in petition footnotes (e.g., the Agency did not review the many news reports referenced in the petition, as there was no way to verify the information presented in them). The Agency also considered other information identified as relevant to the petition's proposals, and information submitted by other stakeholders. In doing so, the Agency concluded that aspects of the supporting material submitted were not relevant in responding to the petitioners' specific request to revise the corrosivity characteristic regulation, while other material was anecdotal or focused on illustrating the intrinsic hazards of some alkaline materials. However, as petitioner comments have redirected the Agency's attention to the petition's supporting materials (PEER comments pp 13-14), the Agency is presenting more detailed information on its examination and evaluation of those materials.

The supporting materials sent to the Agency attached to the September 8, 2011, petition consist of two documents previously developed by petitioner Dr. Jenkins (one dated 2007 and

the other dated 2008), two pages from the 1972 ILO guidance document, and excerpts from several legal declarations and depositions. The two documents developed by Dr. Jenkins provide additional information on her views about the corrosivity of materials, among other issues. Different parts of these two documents were referenced in the petition related to arguments the petition was advancing. The Agency reviewed these two documents in their entirety in the course of developing the tentative denial of the petition and focused in particular on portions of the supporting documents referenced by the petition itself. [13]

The first document, dated May 6, 2007, is a report addressed to members of the U.S. Senate and House of Representatives (i.e., Congress). It consists of two sections, plus 342 endnotes. As described by the document, Part 1 (pages 2-30) "details the orchestrated falsifications by EPA, other governmental agencies and EPA funded scientists of pH data (actually changing the numbers) as well as their use of laboratory methods known to pre-neutralize samples before testing the pH of WTC dust." This part of the document criticizes the data collected on dust related to the WTC disaster by a number of research groups, including data and reports generated by the United States Geological Survey (USGS), researchers at Rutgers University, New York University (NYU), the Agency for Toxic Substances and Disease Registry (ATSDR), the EPA, the National Institute of Environmental Health Sciences (NIEHS), and the University of California, Davis. The scope of Dr. Jenkins' assertions of WTC dust sample mishandling, improper analysis, and incorrect health assessments are broad. In different portions of this discussion, the report describes data as being "falsified" (pp. 3, 6, 14, 17, 19), samples being improperly "pre-neutralized" before pH testing (pp. 11, 12, 16), use of "non-optimal" testing to give "false" test results (p.22), and asserted that researchers made false

[13] The petition also references numerous other sources of information in footnotes to the text, including research papers, government reports (and petitioner comments on a 2003 draft EPA Inspector General report), news reports and other material. EPA retrieved, reviewed and considered the most relevant of these and made them available to the public by placing them in the docket for the tentative denial.

statements about the significance of test results (p. 23). The report goes on to identify the testing Dr. Jenkins believes would have been appropriate for the dust generated by the collapse of the WTC towers (pp 25-28). The report also states that EPA On-Scene Coordinators were on site on the day the towers were attacked and collapsed, and that regulations and guidance required them to do sampling to assess hazards, including pH testing. [14] However, the Agency has been unable to identify such data; apparently such pH testing was not done, or if done, test results were not recorded or reported.

Review of the studies about which Dr. Jenkins expressed concern shows that investigators were evaluating pH and many other properties of the collected dust samples.[15] For example, Lioy (2002) tested for metals, asbestos, anions and cations, dioxins, brominated fire retardants, and the size and composition of different particulate fractions, in addition to pH. Plumlee et.al. (2006) evaluated settled dust samples collected outdoors (31 different locations) and indoors (2 locations; all but one sample collected by USGS on September 17 and 18, 2001), for metals, organic chemicals, pH, alkalinity and specific conductance. Two different leaching tests were done to understand the chemical reaction of dust with water (from acidic rainfall on September 14, and ongoing street washing, dust control, or firefighting) and the potential for dust components to be absorbed by the throat and lungs of those exposed. In a study done by EPA scientists (EPA, 2002), dust samples were tested for physical properties and chemical composition, and were used in testing for the potential adverse effects of the dust on laboratory

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[14] Report Endnotes 125-129 reference EPA Region 6 training materials, and OSHA HAZWOPER regulations at 29 CFR 1910.120, Appendix E.

[15] The pH of the vast majority of non-aqueous samples cannot be measured directly. Rather, most pH testing of solid samples involves adding some amount of water to the sample before testing it using a pH meter, as described in EPA Method 9040B. When testing only the pH of a solid sample of waste, water is often added in a 1:1 ratio, as in EPA Method 9045C. One of Dr. Jenkins' concerns relates to the addition of water to WTC dust samples in ratios higher than one part water to one part waste (i.e., addition of more than one part water to WTC dust samples). However, most investigators were evaluating the dust for parameters and properties beyond pH and used dilutions they believed appropriate for the purposes of their study. To the degree that investigators fully describe the methods of testing and the amount of water added to WTC dust samples in the course of their research, it cannot be considered that they did anything improper; they simply were not using the testing approach Dr. Jenkins believes would have more directly responded to her concerns.

test animals.

Petitioners insist that pH of the whole dust was the key factor investigators should have known to focus on evaluating, and also insist that dust pH values were higher than reported (because investigators did not use the petitioners' preferred test method). These assertions disregard the fact that corrosive chemical burns were not identified among the reported injuries to first responders and others. They also disregard the variable composition and complexity of the dust and WTC worker exposures (which include building materials reduced to fine and coarse particulates, metals, a range of volatile and semivolatile organic chemicals and soot particulates from the ongoing fires) that investigators were trying to understand, as well as discounting the focus on public health concerns about exposure to fine, inhalable particulate matter[16] and asbestos. Petitioner assertions about dust pH also fail to account for the effect of contact with water on the pH of dust (from water use for street washing, firefighting and dust suppression, as well as several rainfall events beginning September 14), which would have moderated dust pH, so that as the dust changed, so did the alkalinity of exposures.[17]

Part 2 of the 2007 report Dr. Jenkins sent to the Congress (pages 31-52) asserts that "Long before 9/11/01—EPA falsifies the pH level causing chemical burns (irreversible tissue damage-)." This part of the report describes the petitioners' concerns about the basis for the current corrosivity regulation. Much of the material in this section of the report was incorporated into the petition (see pp 6-24 of the petition) and the Agency reviewed and considered this material in developing the tentative denial. The issues raised by the petitioners in this discussion

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[16] For information on inhalable particulates see: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics

[17] Mixing of water with atmospheric carbon dioxide forms carbonic acid, which when mixed with the dust would have reduced the pH of the dust. Therefore, the pH of dust to which workers were exposed would have declined over time starting as soon as the dust was exposed to water (USGS 2002, American Chemical Society 2019, Garrabrants et.al 2004). A major rainfall event occurred on September 14 (Cahill, 2004). Also, a report by the EPA-Inspector General (2003) described the successful use of continuous dust suppression by spraying water wherever dust was identified at the site, as well as wetting of the damaged building remains before their demolition (see pages 34-36). The last fires at the WTC site were extinguished in December 2001.

focus on their belief that the corrosivity characteristic regulations should consider only the inherent hazard of waste materials, and not consider the risks posed by possible exposure to materials when they are generated and managed as wastes. Petitioners believe consideration of any information in addition to assessments of intrinsic hazard resulted in a "falsified" corrosivity regulation. The Agency believed in 1980, and continues to believe, that incorporation of waste management considerations is appropriate and within the Agency's discretion in establishing regulations under RCRA (RCRA section 1004(5)(B); 42 USC 6903(5)(B))including for the corrosivity characteristic.

The second document, also developed by Dr. Jenkins (dated October 13, 2008), is described as a supplement to the May 6, 2007 report sent to Congress, and was addressed to the Federal Bureau of Investigation (FBI). The first section of the report identifies statutes petitioners believe may have been violated by EPA's corrosivity characteristic regulation (see pp 2-9), based on their disagreement with the Agency's basis for establishing the regulation. The second section of the report is a recounting of historical incidents in which people were injured when directly and purposely exposed to lime (pp 10-17). The third section of the report is generally a reiteration of petitioner criticisms of the basis for the corrosivity characteristic regulation taken from the 2007 document. This section also criticizes the Agency's Report to Congress on Cement Kiln Dust (59 FR 709, January 6, 1994) and presents assertions regarding WTC dust evaluation. Much of the material is directly taken from the 2007 document (see pp 27-56), including repeating several of the graphs/tables/figures (see pp 11-24 of 2007 report).

The many examples of direct exposure to alkaline materials described in the 2008 document (to the FBI) reiterate the petitioners' view that the Agency should regulate corrosive materials based on assessments of the intrinsic or inherent hazards they may pose from direct exposure, rather than risks that might be posed in the course of waste management. As noted above, the approach advocated by the petitioners is used by GHS, where classification is intended to be based on the "intrinsic hazard" of chemicals, not on risk (although GHS does not

rely on pH to define materials as corrosive if any other data are available; see GHS sections 1.1.2.6, 1.1.3.1, 3.2). Again, risks that might be posed in the course of waste management is an appropriate basis for the corrosivity regulation, and is within the Agency's discretion in implementing RCRA.

4. Petitioners assert that concluding that WTC exposures and injuries are a RCRA damage incident is not necessary to support the petition and also reiterate their assertion that WTC first responder and other worker injuries are a result of exposure to corrosive WTC dust (comments pages 15, 105-124).[18]

When the WTC towers collapsed after being attacked, an estimated one million tons of construction materials and the buildings' contents were pulverized into dust and debris, forming a dust cloud that distributed the dust over a 16-acre area of New York City. Destruction of the towers also resulted in numerous fires, which burned for several months after the collapse of the towers (Chemical & Engineering News, 2003). The petition identified injuries to first responders and rescue and other workers resulting from inhalation exposure to airborne or settled WTC dust as a waste mismanagement damage incident that they believed supported the need to revise the RCRA corrosivity regulations. This assertion was one of the petitioners' main arguments supporting their request for changes to the corrosivity regulation definition. The Agency discussed this issue at length in its tentative denial of the rulemaking petition. (81 FR 21302-21305). Specifically, the Agency made two main arguments concerning petitioner assertions that the WTC dust caused corrosive injuries to first responders and other workers at the WTC site. These are: (1) because of limitations of the available data (i.e., the complexity and variability of the dust composition and exposure levels), it is not possible to establish a causal

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[18] The possibility of exposures to asbestos used as fireproofing in parts of the WTC towers was an immediate and significant public health concern when the towers collapsed, and many studies of WTC dust and airborne materials focus on asbestos. However, as petitioners requested regulatory changes and materials submitted supporting this request do not focus on the presence of asbestos in air or dust samples, the Agency has not addressed asbestos issues in either the tentative denial or today's Notice.

connection between any potential corrosive properties of the dust and the injuries to those exposed; and (2) the injuries documented to have occurred in the WTC first responders and others exposed to potentially harmful dust, while serious, are not corrosive injuries as described in the 1980 background document (EPA 1980) and which the Agency sought to prevent in promulgating the RCRA corrosivity regulation.

While the petition asserted that the WTC exposures are a corrosive waste damage case, petitioner comments submitted in response to the tentative denial seem to be inconsistent as to the relevance of the WTC disaster and exposure of workers and others to the resulting dust. They assert that identification of WTC worker injuries as corrosive injuries is not a critical aspect of their argument supporting a change to the corrosivity regulations, but later in their comments reiterate arguments from the petition that WTC worker injuries are corrosive injuries.

Petitioner comments first assert that it is "[i]rrelevant whether WTC dust, caused corrosive injuries…" because they believe that "[o]ther physical forms of corrosives… whether pH 11.5 and above or pH 12.5 and above have caused injuries" (see page 15 of petitioners' comments). Petitioner comments then reference the materials submitted with and in support of the petition (i.e., the reports developed by Dr. Jenkins from 2007 and 2008 described above) as adequately supporting the petitioned changes to the corrosivity regulation, regardless of conclusions about the effects of WTC dust. Other parts of petitioner comments on the tentative denial repeat the petition's assertions that corrosive properties of the WTC dust caused the injuries (particularly respiratory injuries), reported by first responders and other workers subsequent to their work on the site (see, e.g., pp 108-118 of petitioners' comments). As petitioner comments reiterate their earlier assertions about the corrosive properties of the WTC dust, EPA is responding in today's Notice to those assertions, to make clear its conclusion that information concerning WTC dust and worker exposures and injuries cited by the petitioners does not support the petitioners' overall request.

While the considerable amount of research on WTC worker health makes clear that injuries to WTC workers resulted from their exposure to the WTC dust[19], the existing data do not support attributing the injuries to possible corrosive properties of the dust. As described in the tentative denial, and elsewhere in today's Notice, it is not possible to establish a causal connection between the potential corrosive properties of the dust and the resultant injuries to those exposed for two reasons. First as described in the tentative denial, WTC first responders, site workers, and others were exposed or potentially exposed, from 9/11/2001 until the clean-up concluded (January 2002), to a complex and changing ambient atmosphere that included many chemicals and particulate matter, as represented by evaluation of settled dust samples as well as ambient air test results, and which was unique to the WTC debris and dust.[20] Attribution of the WTC first responder and worker injuries to a single cause or property of the WTC dust, such as its potential corrosivity, is confounded by the wide range and varying concentrations of numerous compounds found in air samples or settled WTC dust, and the changes in dust properties (particularly pH) over time[21]. In one data set, the pH values reported for the outdoor

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[19] See data collected by NIH (https://disasterinfo.nlm.nih.gov/wtc-hazards), the City of New York 9/11 Health index of studies (https://www1.nyc.gov/site/911health/researchers/wtc-scientific-bibliography.page), the September 3, 2011 edition of The Lancet (Volume 378), and many other scientific journal publications (see Bibliography for the tentative denial and today's Notice).

[20] In many industrial settings, the same or very similar waste is generated on an ongoing or repeated basis because of the ongoing production of particular products. While waste varies, the wastes generated over time by a particular industrial process often have some consistency and are generated under conditions defined by the production process, making it easier to identify and assess hazards that may be posed by the waste. However, the WTC dust and debris were both unique to the events of 9/11/2001, had a complex and varying composition at different WTC locations and over time, and workers and others were exposed to it in a range of different settings, conditions, and time periods. Rainfall on 9/14/2001, and other days also altered the properties of the settled dust through carbonation reactions (reducing its pH), as did water used for firefighting and dust suppression. NYC rainfall in 2001 had an average pH of 4.4, which also contributed to neutralizing the dust (National Atmospheric Deposition Program, 2001). Workers were also exposed to smoke from the fires, the last of which was not extinguished until December of 2001. Further, there are not reliable records of where at the WTC site particular workers worked, the days they worked at different locations, their duration of work each day, and the composition of dust at those parts of the WTC site over time. These factors, in combination with the fact of incomplete exposure data make it impossible to identify causal relationships between particular exposures and adverse effects beyond the broad conclusion that many workers exposed to the dust and other pollutants present have experienced respiratory injuries and other adverse effects related to their exposure.

[21] Reviews of compiled data on compounds in the settled dust and/or air samples found up to 287 different chemicals or chemical groups (EPA 2003), or up to 352 different materials and chemicals (WTC Health Program

dust ranged from pH 8.22 to 12.04 for samples collected at 33 locations at the WTC site on September 17 and 18, 2001 (Plumlee, et. al. 2006). In 22 of these samples there were measurable amounts of 39 different metals and inorganics, and up to 22.8% organic compounds. These samples also contained a range of particulates, including fine glass fibers and fine and coarse particulates to which workers were potentially exposed at different locations around the site at different times, as well as being exposed to the toxic metals and organics. The pH of the tested dust would have declined (become more neutral) over the several months workers were at the site, due to carbonation reactions of some dust constituents with water and atmospheric carbon dioxide (as well as the acidic nature of rainfall).[22] In another study, test results for three samples of settled dust collected on September 16 and 17, 2001 showed pH values of 9.2-11.5, and that 40% of the dust consisted of fine glass fibers, 9%-20% was cellulose, and 37%-50% was non-fiber material including construction debris (concrete, gypsum) and inorganic and organic chemicals (Lioy, et.al. 2002).[23] Several rainfall events starting on September 14 and through the first half of October, as well as use of water for firefighting and dust control at the site would have washed out many soluble inorganic constituents from the outdoor dust and also changed its pH (Lioy, 2002; Plumlee, 2006, and Cahill, 2004). A report by the 9/11 WTC Health Program[24] presented an inventory of "9/11 Agents" that were identified that may have posed hazards at the WTC site, the Pentagon crash site, or the Shanksville, PA crash site (WTC Health Program 2018;

2018). Lioy (2006) identified a sequence of 4 distinct exposure categories over time, each with somewhat different mixtures of pollutants, starting with collapse of the towers through December 29, 2001, plus one additional category for indoor exposures. They also identified the lack of an analysis of patterns of population exposure, and failure to test for airborne gases and coarse particulates in the first hours following collapse as significant data gaps that preclude quantitative exposure characterizations for most people.

[22] The National Atmospheric Deposition Program 2001 Annual Report identifies rainfall in the NYC area to have a pH of approximately 4.4. A pH of 7 is neutral, and values below 7.0 are acidic, while values above 7.0 are basic, or alkaline. Also, NOAA's "Records of Climatological Observations" recorded rainfall of 1.9 inches in NY Central Park on September 14, 2001, three days after the disaster. https://www.ncdc.noaa.gov/cdo-web/search

Accessed July 15, 2020.

[23] Also identified in the three samples were: 24 metals, seven pesticides, PCBs, 40 different PAHs, 82 semi-volatile organic compounds, 17 PCCDs and PCDFs, and 6 PBDE flame retardant chemicals.

[24] The 9/11 WTC Health Program is administered by CDC/NIOSH.

https://wwwn.cdc.gov/ResearchGateway/Content/pdfs/Development_of_the_Inventory_of_9-11_Agents_20180717.pdf). The inventory includes 352 chemicals or other materials (e.g., glass fibers, PM2.5). In addition, the 9/11 Agents inventory does not identify pH as a stressor, and while it does include some alkaline chemicals cited by petitioners as posing hazards (i.e., calcium hydroxide and calcium sulfate), it does not include calcium oxide, a compound petitioners repeatedly cite as a key compound of concern.[25]

The National Institute for Occupational Safety and Health[26] (NIOSH) conducted ambient air and worker breathing zone monitoring for a range of possible air pollutants from September 18-October 4, 2001 (CDC, 2002). Samples were collected in areas immediately adjacent to the debris pile, and for individuals actively involved in rescue efforts or working in the vicinity of the debris pile. These samples were found to contain measurable amounts of asbestos, carbon monoxide (CO), diesel exhaust, hydrogen sulfide (H_2S), inorganic acids, mercury and other metals, polycyclic aromatic hydrocarbons (PAHs) and volatile hydrocarbons, and total and respirable particulates. Sulfuric acid was detected in 26 of 27 samples, with all levels less than the NIOSH recommended exposure level (REL) and OSHA permissible exposure level (PEL).[27] Mercury and other metals were well below the relevant NIOSH and OSHA standards, with the exception of exposure of one worker using a cutting torch exposed to cadmium at levels

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[25] The petition and petitioner comments on the Tentative Denial both reference calcium oxide as posing a significant hazard. While Portland cement powder contains calcium oxide, this compound is converted to calcium hydroxide and other calcium compounds in hardened concrete when water is mixed with the cement powder. The hydration reactions of cement powder give the resulting concrete its strength and hardness. (northwestern U. website and U. Illinois website). Petitioners hypothesize the presence of calcium oxide in the WTC dust (see petition page 27), although studies of WTC dust fail to identify it as present, and petitioners identify no studies presenting data showing calcium oxide as present in WTC dust samples. Even if some calcium oxide was present in the dust when the towers collapsed, it would have combined with ambient water vapor (i.e., humidity) or water from rainfall, fire-fighting or dust suppression, and would be unlikely to be present in the dust for more than a day or two, if ever.

[26] NIOSH is part of the U.S. Centers for Disease Control and Prevention (CDC), in the U.S. Department of Health and Human Services. NIOSH is a research agency focused on the study of worker safety and health. Among other activities, NIOSH develops recommended exposure limits (RELs) for hazardous substances or conditions in the workplace (See NIOSH Pocket Guide to Chemical Hazards, at: https://www.cdc.gov/niosh/npg/default.html).

[27] OSHA is the Occupational Safety and Health Administration, which is part of the U.S. Department of Labor. Among other activities, OSHA develops regulations to establish permissible exposure levels (PELs) for worker exposure to airborne chemicals in the workplace (See: 29 CFR 1910.1000).

exceeding the OSHA PEL. PAHs were found only at trace levels, and benzene was the only volatile organic found in 2 of 76 samples at levels exceeding the NIOSH REL, but below the OSHA PEL. For total particulates, values ranged from non-detect to 2.3 mg/m^3, with all samples below the NIOSH REL for Portland cement (10 mg/m^3). Respirable particulates ranged up to 0.32 mg/m^3, well below the NIOSH REL for Portland cement (5 mg/m^3). These data do not support petition assertions that both large and small airborne particulates would have posed corrosive hazards to exposed workers, as all these data show that WTC worker breathing zone concentrations of dust were substantially below both regulatory and health recommended concentration values for cement dust, which petitioners focus on as presenting the greatest hazards.

Maslow et.al (2012) studied the health impacts of different exposures to local residents or individuals (n=785) who worked in buildings near the WTC site, but which were not severely damaged. They found dose-related pulmonary function decrements associated with acute exposure to the WTC dust (exposure on the day the buildings collapsed) and to chronic exposure (from indoor dust).[28] Lower respiratory symptoms were evaluated using spirometry testing of forced expiratory volume and other measures, but no corrosive injuries were reported. A study of children enrolled in the WTC Health Registry initially found a significant increase in new asthma cases associated with exposure to the dust cloud on 9/11/2001 (Thomas, et.al., 2008), and later found that younger children exposed to the dust cloud on 9/11/2001 had a significant increase in respiratory symptoms while older children showed a non-significant increase. No corrosive injuries were reported to have occurred in the children studied. Brackbill et.al., (2006) reported skin rash/irritation in 4% (AOR1.7; $p<0.05$) of adult survivors of collapsed or heavily

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[28] The dose, or exposure levels in this study were based on estimates of the amount of time and distance from the towers individuals reported on the day of the tower's collapse (for acute exposure) and the thickness of the dust layer in homes, cleaning activity, and the amount of time spent in different settings where dust was found. As this was a retrospective study, no testing of dust composition or properties was conducted.

damaged buildings who were caught in the dust and debris cloud, excluding rescue/recovery workers (World Trade Center Health Registry (WTCHR) data; n=8418). Perritt et.al. (2011) reported skin conditions in 4% of WTC workers/volunteers (n=7810), but did not clearly identify the types of skin conditions reported (some may have been traumatic injuries such as abrasions, blisters and contusions). They also reported eye ailments/illness in 9%, and traumatic eye injuries in 6% of the study population, also without a detailed description of the injuries. Huang et.al., (2012) found skin irritation/rashes in 12% of area residents and rescue/recovery workers 3 years after 9/11, and in 6% after 6 years of WTCHR participants (n=42,025). None of these studies identified serious skin injuries occuring in the groups studied. Lippmann et.al. (2015) reviewed and re-evaluated many of the previously published test data and reports of adverse effects in WTC first responders, worker and others. They hypothesized that the unique conditions caused by the WTC tower collapse resulted in greater inhalation of large and coarse particles (consisting of concrete and gypsum dust, and synthetic vitreous fibers) than would be expected to occur, and that these larger irritant particles are likely to have caused many of the respiratory injuries in exposed WTC workers and others. However, the existing data are inadequate to establish the air concentrations of dust components and pH of the material they believe are responsible for the respiratory injuries identified in the WTC population, so no quantitative correlations between exposures and adverse effects can be assessed or identified. Further, as discussed above, these injuries, while serious, are not consistent with the gross tissue injuries the Agency sought to prevent in regulating some wastes as hazardous due to their corrosive properties. Finally, the composition of the large particle dust Lippmann believes to be the cause of WTC worker respiratory injuries appears to be unique to the WTC disaster, making the WTC circumstance a poor example of the potential hazards indicative of and associated with nationwide waste management practices.

In their comments (pp. 105-107), petitioners repeat the petition's criticisms of data published on the composition and properties of WTC dust (particularly its pH) to which workers

were or may have been exposed, and criticize the Agency's reliance on these data in the tentative denial. The petitioners' comments argue that in relying on these data as part of the basis of the tentative denial, the Agency fails to adhere to EPA data quality and integrity guidance.[29] The tentative denial and today's Notice identify the sources of all data on WTC dust and aerosols that have been relied on in evaluating and responding to the Petition and comments on the tentative denial. Those information sources describe the manner in which dust and other samples were collected, the dates and locations for data collection, sample handling procedures, and sample testing methods. As discussed above, investigators were evaluating a number of different properties of the dust and used tests they believed were suited to assessing the dust properties they were interested in investigating. The dust pH was tested for many samples, using several different approaches, although no investigators used the petitioners' preferred test, EPA Method 9045. Petitioners believe EPA's reliance on pH data collected using tests other than Method 9045 is inappropriate and violates the Agency's data quality policies and obligations. However, the pH data the Agency has relied on is the WTC dust pH data that exist; there are no WTC dust pH data developed using Method 9045 that the Agency is aware of, and the petitioners have not identified nor provided the Agency with any WTC dust pH data collected using Method 9045. The Agency has therefore relied on the existing data that it believes are most relevant for evaluating WTC first responder and rescue/recovery/debris removal worker and other exposures, despite any shortcomings. The petitioners' assertions about the results that may have been produced by evaluating the dust using Method 9045 cannot substitute for the data that do exist. Because the different investigators describe their methods and approaches for evaluating the dust and potential exposures in published articles (or in some instances, on government websites)

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[29] See: Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by the Environmental Protection Agency, EPA/260R-02-008, October 2002

presenting the results of research, the test results and their relevance to the questions petitioners raise can be evaluated. Therefore, while not the testing petitioners would have recommended, petitioner assertions that these data are somehow fraudulent, and that the Agency has used them inappropriately, are baseless.

The tentative denial also described the types of injuries WTC workers exposed to the dust have experienced (81 FR 21303; April 11, 2016). One of the most frequent types of injury identified in WTC workers are different types of chronic decrements in respiratory capacity. However, as discussed in the tentative denial, these injuries, while quite serious in many cases, are different from the injuries the Agency sought to prevent in establishing the corrosivity characteristic regulation, and the available data do not establish a causal connection between dust pH and these injuries. Petitioners have in their comments identified no studies reporting gross corrosive injuries (as described in the 1980 corrosivity regulation background document) in WTC first responders, workers at the site, or others. (See petitioner comments pp.108-115)

Petitioners further criticize the Agency as conducting a biased and incomplete review of the available data. The Agency conducted an extensive review of petitioner submitted data as well as additional relevant materials identified by the Agency (approximately 400 references were placed in the public docket supporting the tentative denial), and additional studies have been reviewed in the course of developing today's Notice and response to comments document. As the published scientific literature on the WTC disaster is voluminous, comprising hundreds of studies addressing a range of topics, the Agency has focused its efforts on data it believes to be most relevant to assessing the petitioners' requested regulatory revisions, including several studies noted in petitioner comments. This review has included primarily data on WTC dust composition and properties (both as settled dust and as airborne material) and data on the adverse health effects experienced by first responders, site clean-up workers, and others potentially exposed to the dust and other pollutants present at the WTC site.

Petitioners also argue that in responding to the petition, the Agency did not adequately consider its own guidance on evaluating the hazards that might result from exposure to more than one chemical. Developing a comprehensive and detailed understanding of the adverse health effects suffered by first responders, WTC workers and others resulting from their exposures at the WTC site is important work that is ongoing by many researchers, and parts of the Agency's technical guidance on evaluating multiple or cumulative exposures may be helpful in these efforts. However, the Agency's purpose in issuing the tentative denial and today's Notice is much narrower. In responding to the petitioners' requests for specific revisions to the RCRA corrosivity characteristic regulation, the Agency's purpose in examining WTC exposures and the resulting adverse health effects is to understand whether corrosive injuries resulted from dust or other exposures related to waste management at the WTC site, and whether revisions to the corrosivity regulation could, in some future incident that might result in similar exposures, prevent corrosive injuries. Petitioners discussed this question in both the petition and in their comments (pp. 96-97) on the Agency's tentative denial of the petition. The Agency examined this question extensively in the tentative denial and concluded that the injuries suffered were not corrosive injuries as that term has been used in the background support materials for the RCRA corrosivity regulation (81 FR 21302-21304; April 11, 2016) .[30] In addition, the petition did not identify how revised RCRA corrosivity regulations could change waste management practices to prevent injuries in some future incident that could cause exposures similar to those at the WTC disaster site. In response to comments on the tentative denial submitted by petitioners and others, the Agency examines these issues again in today's Notice and comes to the same conclusions as in the tentative denial. Further, petitioners themselves acknowledge that establishing that WTC first responders, workers and others suffered corrosive injuries is not a

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[30] GHS relies on the same type of serious injury for defining corrosive materials as does the 1980 Corrosivity background document. GHS Chapter 3.2.1.1 states: "*Skin corrosion* refers to the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis occurring after exposure to a substance or mixture."

critical part of their overall argument for revising the corrosivity regulation (See petitioners' comments p. 15).

5. The petitioners assert that EPA misunderstands the applicability of RCRA regulations to the WTC dust and debris (petition pp 67-70).

In comments on the tentative denial, petitioners state that "EPA was contending that there were no "solid wastes" or "hazardous wastes" from the WTC that would be subject to any RCRA regulations." The petitioners' discussion goes on to reference the discussion on pages 83 FR 21304-21305 of the tentative denial and concludes that: "Clearly, the debris and dust from the WTC collapse met the definition of solid waste under RCRA".

The discussion of RCRA applicability in the tentative denial responded to the petition's failure to describe how the proposed changes to the RCRA corrosivity regulation could have reduced the hazards to the WTC first responders and other workers, the local residents, and others. The tentative denial did not imply that the Agency believed no waste management occurred in the course of clearing and removing debris from the site and transporting and landfilling it at the Fresh Kills landfill.

However, the available data do not lend themself to identifying waste and waste management related exposures to workers, as distinct from other exposures. The petition's discussion of WTC exposures comingled all potential exposures to all potentially exposed people in all settings and did not attempt to distinguish worker exposures that may have been related to waste management activities from exposures resulting from other activities or in other settings. This issue is important in considering the petitioners' requests, as RCRA regulations can only apply to waste and waste management activities.[31] Further, there are situations in which

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[31] While all exposures to WTC dust may have posed some hazard, only exposures resulting from waste or waste

determining the RCRA regulatory status of a material (i.e., whether it is a waste, and if it is a waste, whether it is also a hazardous waste) requires careful consideration, and the events at the WTC site represent such a case.

The WTC disaster presented a unique and complex set of worker activities and potential exposures. At different (and frequently overlapping) times, first responders, volunteers and hired contractor workers cleared debris for transport to the Fresh Kills landfill in the course of searching for survivors and later, to recover human remains. While collection, loading, transport and deposit of WTC dust and debris at the landfill would normally be considered waste disposal operations, this case may be more complex. A primary activity at the Fresh Kills landfill was sorting/screening and examining all of the dust and loose debris sent there, to identify and recover any human remains or personal property of victims. The sorting/screening work was also directed at recovering parts of the airliners used to destroy the towers for possible future use as evidence in a trial or legal proceeding.[32] Because of these ongoing recovery operations, loose debris at the landfill would likely not be considered discarded, and so waste, until the recovery operations were completed, on July 26, 2002 (Ekenga et.al., 2011; Cone et.al., 2016).[33] The other major types of debris cleared from the WTC site were large chunks of concrete[34], and the steel beams that supported the buildings. The pieces of concrete would generally have been

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management can be controlled using RCRA regulations. To be considered a RCRA solid waste a material must be disposed of or abandoned, as described at 40 CFR 260.10 - 261.2. Some of the highest exposures to WTC dust, such as on the day of the disaster, are clearly not related to waste or waste management activities.

[32] In a2011study, Ekenga, et.al., reported that 4257 human remains, and 54,000 personal items were recovered from the dust and debris through the screening done at the landfill site. The Agency has never considered human remains or material that contains human remains to be waste. Also, material that has ongoing potential use as evidence in legal proceedings is not considered waste until such proceedings conclude and the material is no longer needed. See: 70 FR 74881, December 16, 2005, and EPA policy memos dated September 5, 1989; May 9, 1990; January 15, 2010, and August 11, 1988.

[33] These two studies of workers transporting and handling debris at the landfill did not present any quantitative data on debris composition and properties, nor possible exposures from these operations, so it is not possible to identify hazards that might have been mitigated by RCRA regulations, where they might have been applicable.

[34] Petitioners' requested revisions to the corrosivity characteristic regulation could potentially apply to pieces of broken concrete.

considered waste when being handled for transport to the landfill (although some may have been recycled), and many of the steel beams were sold as scrap metal for recycling (https://www.chicagotribune.com/news/ct-xpm-2002-01-27-0201270268-story.html; https://edition.cnn.com/2002/WORLD/asiapcf/east/01/23/china.wtcsteel/).

The overlapping nature of rescue, recovery, firefighting, demolition and debris removal activities at the WTC disaster site, and screening for recoverable materials at the landfill, makes it very difficult to distinguish between conventional waste management-related activities and their potentially associated exposures, and exposures unrelated to waste management, and therefore to identify hazards attributable to waste and waste management activities. It remains unclear whether or how the RCRA corrosivity regulation revisions sought by the petitioners may have in this case (or could in some future case that may be similar) prevented the worker (and other) exposures and injuries, nor do the petitioners clarify this nexus in their petition or their comments on the tentative denial.

6. The petitioners assert that the Agency improperly considered the potential impact of the requested corrosivity characteristic revisions.

Petitioner comments assert that in developing the tentative denial, the Agency improperly considered information provided by industry stakeholders on the possible impacts of changing the corrosivity regulation (petitioner comments pp 39-48). While the tentative denial was being developed, industry stakeholders met with and submitted to the Agency information describing their concerns about the regulatory changes sought by the petition. Part of the industry submission presented estimates of the potential impact of the regulatory revisions being sought by the petitioners on different industries. The Agency reviewed and placed these submissions, as well as other communications with the industry stakeholders, in the public docket supporting the tentative denial. The tentative denial noted that the industry estimates were in the docket, and that the Agency did consider them but did not evaluate or attempt to verify them (See 81 FR

21306, April 11, 2016).[35]

Petitioner comments assert that the Agency significantly and improperly relied on the industry impact and cost estimates in developing the tentative denial and argue that RCRA does not allow the consideration of economic impacts in developing RCRA regulations.[36] However, the rationale for tentatively denying the petitioners' requests is discussed extensively in the tentative denial, and the tentative denial is not based on the potential economic impacts of the petitioners' proposals. Rather, the discussion in the tentative denial focuses on evaluating the available data on exposures to and adverse effects on workers exposed to materials the petitioners identified as being of concern and as illustrating the need for revisions to the RCRA corrosivity regulations. It does not reference the industry estimates of possible economic impacts from a regulatory change. The key data the Agency considered in coming to its conclusions include the properties of and exposures to dust at the WTC disaster site, cement manufacturing facilities, and building demolition events; the type and severity of adverse health effects attributable to these exposures; and consideration of whether the materials were wastes under RCRA. As discussed above, the adverse effects associated with these exposures were not corrosive injuries of the type or severity the Agency sought to prevent in establishing the corrosivity characteristic regulations. At the WTC site, the properties of the dust to which workers may have been exposed was also of varying composition and the pH of the dust varied at different parts of the site and changed over time with exposure to water and ambient air. Also,

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[35] The Administrative Procedure Act requires the Agency to consider all public comments on the Tentative Denial. The industry stakeholders submitted the same information on possible impacts to industries referenced in the tentative denial as comments on the tentative denial, so the Agency is obligated to consider them here. Although the Agency considered these comments EPA did not fact-check or attempt to verify the specific industry estimates because they were not part of the basis for EPA's decision-making. The Agency did not develop its own assessment of potential impacts of revising the corrosivity regulation, as the available data on exposures and health effects did not support the need to revise the RCRA corrosivity regulations.

[36] See, Utility Solid Waste Activities Group v. EPA, 901 F.3d 414 (D.C. Cir. 2018).

many WTC dust measurements showed pH values less than pH 11, and so these data did not support a change in the regulatory pH value to 11.5.

The Agency has separately assessed the hazards of CKD, and despite its high pH (pH 10-13), did not find corrosive injury to potentially exposed workers.[37] The Agency further identified a number of studies of cement plant workers, including two reviews of these studies. In 2005, the United Kingdom Health and Safety Executive published a Hazard Assessment Document focused on Portland cement dust exposures that reviewed 15 studies of exposures to and adverse health effects occurring in cement plant workers. Fell and Nordby (2017) conducted a systematic literature review that identified 26 research publications focused on cement plant exposures and non-malignant respiratory effects. While some adverse effects of exposure were identified, neither of these reviews identified corrosive injuries among the exposed workers. These studies do not distinguish between production and waste management-related exposures at the cement plants; however, CKD and cement are very similar in composition, and some cement plant worker exposures would have included CKD handling and management. Also, many of the reviewed studies were of cement production outside the U.S., where worker safety protections may be less stringent, and exposures may have been higher than is typical in the U.S. The investigators presenting these studies conducted medical examinations of the exposed workers to identify adverse health effects that may be associated with their workplace exposures. The lack of corrosive injuries in these exposed worker populations indicates that the CKD and cement dust exposures do not result in corrosive injuries, and so do not support a need to revise the RCRA corrosivity regulation. These reviews and many of the publications reviewed are discussed in greater detail in the response to comments document accompanying today's Notice.

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[37] As discussed in the tentative denial (81 FR 21306, April 11, 2016) CKD is an air pollution control residue from cement manufacturing activities, for which EPA has made a RCRA status determination. See 60 FR 7366, February 7, 1995 and EPA 1997 (Ref: Population risks from indirect exposure pathways and population effects from exposure to airborne particles from cement kiln dust waste, EPA, August 1997 Draft).

Data from instances of dust exposure resulting from building demolitions identified by petitioners may have established that there have been exposures in these settings, but it did not identify any corrosive injuries in people exposed. Further, these examples pose the question of distinguishing situations and hazards that might involve waste or waste handling (which may be subject to RCRA), from materials, activity or hazards not related to waste or waste management. The information available to the Agency in this case is not adequate to distinguish waste-related exposures from other exposures, particularly for the WTC and building demolition exposures; nor do petitioners make a distinction between waste-related and non-waste exposures in the petition or their comments on the tentative denial. Because the available data did not identify corrosive injuries resulting from dust exposure, including dust exhibiting pH values between 11.5 and 12.5, and were not adequate to identify waste-management related exposures (as distinct from other exposures), the Agency concluded that the regulatory revisions requested by the petitioners were not warranted.

7. Other petitioner comments

The petitioners also expressed concern that the Agency's tentative denial inadequately considered materials on other possible corrosivity damage cases and the corrosivity regulations of several states that differ from the federal regulations (state waste management requirements may be more stringent that the federal requirements). The Agency did identify information on these two topics in the course of developing the tentative denial, and this information was placed in the public docket. However, these issues were not discussed in the tentative denial because the Agency concluded that the available information did not strongly argue for either changing or not changing the corrosivity regulation. In response to petitioner concerns, the Agency's assessment of the materials relating to these two issues is below.

As part of assessing the petition, EPA hired a consultant to identify and develop a report on any environmental damage cases, or incidents, potentially caused by corrosive waste

mismanagement that have occurred since the corrosivity regulation was established. The resulting information was placed in the docket supporting the tentative denial. Of the 21 possible damage incidents identified by the contractor, one was the WTC site, which is addressed extensively elsewhere in this Notice, and four identified acids only or no corrosive material. Of the remaining 16 incidents, pH data were reported for eight, with four showing pH values above 12.5, two reported values less than pH 11.5, and three reported data between pH 11.5 and 12. At one site without pH data, some amount of sodium hydroxide was reported, which would potentially be a newly regulated hazardous waste under the petitioners' proposals. CKD mismanagement over the period 1984-1993 was identified as the cause of environmental damage at nine of the 16 incidents identified, all of which were reviewed in the 1994 CKD Report to Congress (see: 59 FR 709, January 6, 1994 and Tables 5-2 and 5-3 of the report). For seven of these, data ranging from pH 11.0-13.6 were reported. None of the incidents reported worker or other injuries either before or during remediation.

These incidents illustrate the fact that potentially corrosive wastes have in the past, and may potentially in the future, be mismanaged. However, when considered together, these incidents do not clearly argue either for or against revision of the current corrosivity regulation. The wastes at several sites had pH values less than the petitioners' requested value of pH 11.5 (and so would not be regulated under the proposed revisions), several others reported pH values above the current regulatory standard (and were aqueous wastes), and so were already regulated as RCRA corrosive hazardous waste. Wastes at the three sites with pH between these values would be newly regulated under the petitioners' proposed revisions. Two of these sites had leachate or ponded water contaminated with CKD, and the third was a drum reconditioner site.

Petitioners comments also identify a National Priorities List (NPL or Superfund) site not considered in the tentative denial, where caustic soda (sodium hydroxide) and hydrofluoric acid were found to be mishandled by the state of New Hampshire (at the Kearsarge Metallurgical Corp site; EPA, 1990). Significant amounts of these materials were removed from the site

before listing on the NPL, although an unspecified amount of potentially corrosive material was found in waste piles and in drums buried under the waste piles. However, the Record of Decision (ROD) does not provide enough detail to understand the relevance of this incident to the petitioners' concerns. No pH testing is reported in the ROD, and while some of the material was identified as being solid, other material was liquid. No injuries to workers or others were reported.

Petitioners also raise a concern that the tentative denial did not specifically address the several states that have waste corrosivity regulations that are more stringent or broader in scope than the federal regulations, although materials related to these state programs were included in the rulemaking docket.[38] Under RCRA, states may be authorized to implement the federal hazardous waste regulatory program within their state, and most states have sought and received such authorization (RCRA 3006(b)). States are also allowed to set more stringent regulatory standards for wastes generated or managed in their state, and a number of states have broadened the scope of their hazardous waste management regulations beyond the federal requirements. These changes may be intended to address hazards from wastes that are particular to that state, may reflect state regulatory policy choices that are different from federal regulations, or for other reasons. These regulations apply only to waste generated or managed within the state.

Several states have expanded the scope of the RCRA corrosivity regulation for wastes in their states, including California, Washington, New Hampshire, Vermont and Rhode Island. All of these states expanded their definitions of corrosive waste to include non-aqueous wastes, but all retained the RCRA regulatory value of pH 12.5 (or higher). However, Rhode Island has

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[38] The agency also reviewed state waste regulations that existed in 1980 when developing the existing corrosivity regulation. Of the 11 states that already had waste corrosivity regulations, eight used pH 12 as their regulatory value, one used pH 11, and two used other types of testing to identify corrosive hazardous waste. (EPA 1980, PP A1-A2.)

withdrawn its regulation for non-aqueous corrosives.[39] California regulates solid corrosives, but excludes waste concrete, cement, cement kiln dust and clinker from regulation as corrosive hazardous waste.[40] The Agency collected some data on wastes regulated under these expanded state programs, but they were of limited value in considering the petitioners' requests. California's waste identification codes do not distinguish between aqueous and non-aqueous corrosive waste, so their data would not have helped the Agency understand implementation of their non-aqueous corrosive waste regulatory program. Data from other states also did not provide the Agency with much insight about regulating non-aqueous wastes, as they are not heavily industrialized states, generate relatively little hazardous waste, and may not be representative of more industrialized states and the types and volumes of wastes their industries might generate (EPA 2011, EPA 2020).

B. Industry stakeholder comments

A number of different companies and industry groups submitted comments on the tentative denial of the corrosivity rulemaking petition. One group of 18 trade entities and companies included the American Chemistry Council (ACC), American Iron and Steel Institute (AISI), the American Fuel & Petrochemical Manufacturers, the Portland Cement Association (PCA), and the waste treatment and disposal company Waste Management Inc., among others. Other industry commenters include the Retail Industry Leaders Association (RILA), the National Ready-Mixed Concrete Association, the Environmental Technology Council (ETC; representing hazardous waste treatment and disposal companies), the Utility Solid Waste Activities Group (USWAG; representing 110 energy utilities and energy generating companies), and another group of industries identifying themselves as the "RCRA Corrective Action Project"

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[39] Non-aqueous corrosive wastes were formerly Rhode Island Hazardous Waste R004. The R004 designation is identified as "reserved" in Rhode Island's current regulations (250-RICR-140-10-1).

[40] See California Health and Safety Code Sec. 25143.8

(representing Waste Management, Inc. and apparently other Fortune 50 companies not identified in the comment).

Several of these companies or associations also submitted comments on the tentative denial to the Agency as part of the Agency's broad regulation review efforts that solicited public comments starting April 13, 2017 (82 FR 17793, April 11, 2016). New comments were sent by a group calling itself the "Federal Recycling and Remediation Council" composed of a number of industrial companies that believe they might be affected by changes to RCRA regulations (although the submission did not identify its members), the ACC, and the Holly Frontier Corporation (a petroleum refiner).

These commenters supported the Agency's analysis and conclusions presented in the tentative denial and/or urged the Agency to issue a final denial of the petition as soon as practicable. These companies and organizations identified a number of concerns in expressing their opposition to the regulatory revisions sought by the petition. Their concerns include a number of possible impacts of the proposed regulatory changes, and many commenters' belief that the regulatory changes sought would, if implemented, provide no meaningful public health benefit (although no risk assessment nor other evaluation was submitted in support of this conclusion).

Industry commenters were concerned about both cost and non-cost impacts of the proposed changes. The regulatory changes sought by the petitioners would, if implemented, result in more stringent definitions for corrosive waste, and/or broaden the scope of the regulation, and so more waste would be regulated as corrosive hazardous waste. The industry comments on the tentative denial reiterate their earlier estimates (submitted to the Agency while the tentative denial was under development, and referenced in the tentative denial) of the types and volumes of waste generated by facilities from different industries they believe would become newly regulated under the proposed revisions, and the possible cost of managing such

additional waste volumes as RCRA hazardous. Industry commenters were also concerned about the impact of the proposed regulatory requirements on the use/re-use of certain waste materials. As described above, the proposed revisions could have a significant impact on the reuse of POTW biosolids as fertilizer.

Commenters on the tentative denial also identified several non-economic impacts that could occur under revised corrosivity regulations. Commenters representing POTWs expressed concern that lowering the regulatory pH value to 11.5 could increase the risk of hydrogen sulfide (H_2S, a toxic gas) formation in sewer systems and exposure to workers, due to both the lower pH, and the possible addition of sulfuric acid to wastewater to reduce its pH for compliance with wastewater pretreatment requirements. These commenters also expressed concern that lower pH wastewater would allow more bacterial growth in wastewater treatment systems, which can corrode system components. While the water treatment facility concerns may have some merit, the degree to which pH reduction pre-treatment may be used is not clear, as RCRA generally allows discharges of hazardous wastewaters to POTWs under 40 CFR 261.4(a)(1). Therefore, it is not clear how much H_2S risk might increase under the petitioners' proposals. Research on H_2S control methods indicates pH adjustment below pH 11.5 may continue to be effective, and treatment with ferric chloride can precipitate out the sulfur if needed. Maintaining pH 8.6-9.0 can reduce the transfer of H_2S from liquid to the gas phase in sewers, and reduce sulfide and methane production, although pH values higher than pH 9.0 may interfere with treatment plant digester bacteria (Gutierrez et.al., 2009). However, "shock dosing" of sewer systems up to pH 12.5-13.0 using sodium hydroxide for a short time period is also used in some instances (Park et.al., 2014).

Other commenters identified potential negative impacts to hazardous waste treatment methods and operations for other hazardous wastes, and to EPA's Land Disposal Restriction (LDR) waste treatment regulatory program. Alkaline chemicals are frequently used in stabilization/solidification treatment of toxic metals occurring in hazardous wastes, to

immobilize them (by converting metals to insoluble salts, or by changing matrix pH to reduce solubility) and reduce possible release to the environment (Conner, 1990; EPA, 1991). Also, Portland cement is one of the most frequently used materials for solidification/stabilization of inorganic hazardous waste. Wastes initially exhibiting the toxicity characteristic because of their metals content can, after meeting the LDR treatment requirements, be disposed in a non-hazardous waste landfill. However, for many metal-bearing wastes, metal compound solubility is minimized at or below pH values of 11.0 (CdOH has its minimum solubility around pH 11); minimum solubilities for other metal oxides occur at lower pHs; (Conner, 1990; Conner and Hoeffner, 1998). It is therefore difficult to assess the likely impact of a revised corrosivity regulation on treatment of metal-bearing hazardous waste.

One commenter noted that the petitioned-for revisions could result in the regulation of waste concrete as hazardous, a waste they believe has been safely managed in construction and demolition (C&D) landfills for many years. Review of leachate data from C&D landfills published from 1995-2014 indicate an overall pH range of 6.2-8.9 (Lopez and Lobo, 2014), indicating that disposed concrete is not creating highly alkaline conditions in landfills that currently accept it for disposal. Further, while the state of California does regulate corrosive solids as hazardous within the state, it excludes waste cement, CKD, clinker and clinker dust (California Health and Safety Code Sec 25143.8) and waste concrete from this designation (CalTrans, 2004).

Industry stakeholder commenters also believe that the public health benefits of revised corrosivity regulations would be minimal. This belief is based in part on the lack of a significant number of worker injuries or damage cases they have observed during their operations related to the handling of wastes that are not regulated as hazardous under the current regulation, but that might be regulated under regulations incorporating the petitioners' requests. In the course of developing the tentative denial, the Agency reviewed several information sources to identify injuries or other damage that may have resulted from waste the petition would newly regulate

(see: 81 FR 21307, April 11, 2016). These included an OSHA worker injury database, damage cases identified in an Agency report as resulting from recycling activities, and a report of a contractor search for damage cases that might be related to waste the petitioners have sought to regulate. None of these sources identified significant corrosive injuries from waste management or from aspects of production processes that might pose exposures similar to those that might occur during waste management.

C. Other comments

Two state environmental agencies submitted comments on the Agency's tentative denial. The Michigan Department of Environmental Quality (DEQ) supported the tentative denial evaluation of the rulemaking petition, and the Agency's conclusions presented there, without further comment. The Oklahoma DEQ supported the regulation of corrosive solids, also without further comment or discussion.

A number of comments were also received from individual members of the public. These include five law school students, three unaffiliated individuals, and four anonymous commenters. The Agency responds to these comments in the Response to Comments document accompanying today's Notice.

V. EPA's Conclusions and Rationale for its Final Action Denying the PEER/ Jenkins Rulemaking Petition to Revise the RCRA Corrosivity Hazardous Characteristic Regulation

The Agency has reviewed and evaluated the key comments, information, and arguments submitted by the petitioners and other interested stakeholders on the Agency's tentative denial of the rulemaking petition, as well as additional relevant information identified by the Agency. Based on its evaluation of the information as presented in this Notice and in the Response to Comment Document accompanying today's Notice, the Agency has concluded that because the available information does not support revision of the RCRA corrosivity characteristic regulations sought by the petitioners, such revisions are unwarranted. Consequently, the Agency

affirms its tentative denial and presents this Notice of final denial of the PEER/Jenkins petition in its entirety.

In their comments on the tentative denial, the petitioners argue that EPA improperly relied on waste treatment and management considerations as part of the basis for the corrosivity regulation. Petitioners assert that assessments of the inherent hazard of wastes should be the only consideration in establishing the corrosivity regulation under RCRA, and further, that the Agency is legally obligated to promulgate the corrosivity hazard assessments presented in GHS and ILO guidance as the RCRA corrosivity regulatory standard. Much of the information provided and arguments made by petitioners are intended to support this view. The Agency disagrees for several important reasons. The Agency has the discretion under RCRA to regulate potentially corrosive wastes based on the risks they may pose when plausibly mismanaged, and most corrosive waste does not pose the extremely high level of hazard posed by acutely hazardous wastes, such as wastes that are acutely lethal toxins with very low LD_{50} values or explosives or similarly highly reactive compounds. Absent evidence of such an acute degree of intrinsic hazard, EPA's approach to identifying which wastes are hazardous under RCRA is based on the risk posed when waste is mismanaged, which is a key factor to evaluate in hazardous waste determinations, and has been used to establish regulations for other hazardous characteristics and many hazardous waste listings.[41] All waste, regardless of whether the waste is classified as hazardous, is intended to be subject to some level of control under RCRA, and for most waste, the intrinsic hazard is only one factor considered in determining whether the waste is hazardous under RCRA. The Agency has used its discretion to take this approach when

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[41] In promulgating the RCRA hazardous waste identification program, the Agency noted that the purpose of the regulation is to identify those wastes which, because of the hazards they may pose in transportation, treatment, storage or disposal, should be subject to appropriate management requirements under Subtitle C. (45 FR 33090, May 19, 1980).

developing regulations for many hazardous wastes promulgated under the authority of RCRA.[42]

Further, reliance on international guidance in developing regulatory programs such as that provided by the ILO or in the GHS, is discretionary, and RCRA and other statutes do not reference nor require the use of such guidance in developing regulatory programs. As noted, the Agency considered the ILO guidance as one factor in establishing the corrosivity regulation, but also considered waste management practices as part of its determination. Petitioners' assertions that only inherent hazard may be considered identifies their disagreement with the Agency's approach to regulating hazardous waste. However, the program structure developed by the Agency in 1980 is well within Agency discretion under RCRA, and has been successfully implemented for more than 40 years.

The other key question regarding the petition concerns whether the record compiled for this action indicates that the current corrosivity regulation is inadequately stringent to protect human health and the environment from mismanagement of potentially corrosive waste, as asserted by the petitioners. Petitioners acknowledge that it is not necessary to conclude that WTC injuries are corrosive injuries to supporting their petition requests. Petitioners nonetheless continue to argue that WTC first responder and other injuries have resulted from corrosive properties of the WTC dust, without considering that injuries may have been due to exposure to high levels of other dust components, including pulverized glass, smoke from ongoing fires, or the many toxic constituents that have been identified in WTC dust and air samples, or the combination of these different exposures. Petitioners also insist in the petition and in their comments on the tentative denial that WTC injuries are corrosive injuries, despite the fact that research publications reporting on studies of the WTC dust-exposed cohorts describe primarily

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[42] The Agency relies on intrinsic hazard as the sole basis to classify waste as hazardous for only very highly, acutely toxic wastes and a few other wastes that pose extreme hazards regardless of how they are managed. See 40 CFR 261.11(a)(2). Other hazardous characteristics regulations and many hazardous waste listings consider aspects of waste management (e.g., 40 CFR 261.11(a)(3)).

chronic respiratory symptoms (such as asthma or reduced forced expiratory volume) resulting from their exposure. While these are serious symptoms of adverse health effects, none of the research publications and reports identified by the Agency, the petitioners, or other commenters on the tentative denial, identify the type of gross tissue injury the Agency described in the 1980 background document and sought to prevent in promulgating the RCRA corrosivity characteristic. The Agency's review includes health effects studies of first responders, other WTC workers, and area residents, including children exposed to the WTC dust cloud on the day the towers collapsed. Petitioners also criticize much of the data collected on WTC dust samples (both settled dust and worker breathing-zone samples) that were evaluated to understand exposures and insist that other testing of samples was or should have been conducted. They argue that many of the studies of WTC dust were inappropriate or invalid because they did not use test methods petitioners believe to be more appropriate and hypothesize about the likely results of testing using their preferred protocols. However, these arguments are speculative, and the Agency cannot rely on the petitioners' conjectures and speculations as the basis for a regulation. While more systematic collection of human exposure and other data concerning the WTC disaster and its aftermath may have provided a better basis for evaluating WTC exposures, the Agency must rely on the data that do exist.

Petitioners also fail to connect any particular WTC exposures to waste management activities. That is, not all WTC worker and other exposures were exposures to waste, but petitioners do not identify particular exposures as resulting from waste or waste management, and distinguish them from exposures unrelated to waste management activities (such as exposure to the dust cloud on the day the towers collapsed). Identifying exposures resulting from waste management is a necessary part of petitioner arguments to revise the corrosivity regulation, as RCRA gives the Agency authority only to control waste and waste management and its resulting hazards. The Agency's conclusion after examining the existing data related to this issue is that based on available data, it is not possible to identify WTC exposures that may be related to waste

management as distinct from activities and exposures unrelated to waste management. Absent a connection to waste management activities, RCRA does not apply. The petitioners have also not explained their assertion that more stringent RCRA corrosivity regulation would have reduced WTC worker exposures and hazards, nor how their requested revision of the RCRA corrosivity regulation now would reduce risks in a future event.

Other exposures cited by the petitioners as supporting the need for revision of the corrosivity regulations (exposure to CKD and building demolition dust) similarly have also not been found to cause corrosive injury. Petitioners also identify a Superfund site not considered in developing the tentative denial, where caustic soda (sodium hydroxide) and hydrofluoric acid were found to be mishandled but were removed from the site and disposed before NPL listing, although some residual material was found. However, the lack of pH testing or other detailed reporting of this material makes it difficult to evaluate its relevance to the petitioners' requests. No off-site contamination, ecological damage or injuries were identified.

In consideration of the information and arguments submitted to the Agency in response to its tentative denial of the petitioners' rulemaking request, and the Agency's evaluation and other relevant information identified by the Agency, as described above and in the Response to Comments document accompanying today's Notice, the Agency has determined that because changes to the existing RCRA corrosivity characteristic regulation are not supported by the available information, such changes are unwarranted. Consequently, the Agency denies the PEER/Jenkins Rulemaking petition to revise the RCRA corrosivity regulation in its entirety.

List of Subjects in 40 CFR Part 261

Environmental protection, Hazardous waste, Incorporation by reference, Recycling, Reporting and recordkeeping requirements, Recycling.

Barry Breen,

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Office of Land and Emergency Management.

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